

100 → Struct
 {
 102 → Unsigned int a : 1;
 104 → Unsigned int b : 2;
 106 → Unsigned int c : 8;
 } abc

Fig. 1 (Prior Art)

108 → abc.b = value
 110 → readvalue = abc.b

Fig. 2 (Prior Art)

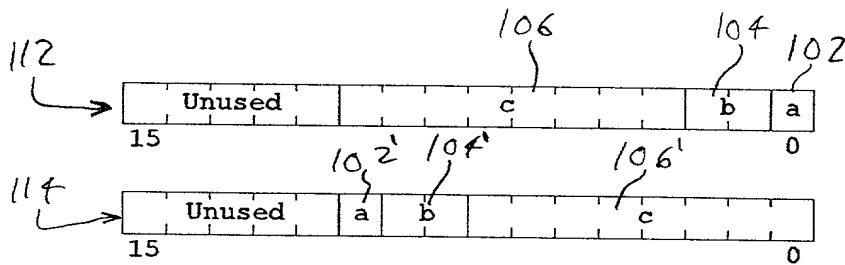


Fig. 3 (Prior Art)

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116  →
118  → unsigned int abc;
120  → #define MASK_a 0001 // 0000000000000001
122  → #define MASK_b 0006 // 0000000000000110
124  → #define MASK_c 07f8 // 0000011111111000
126  → #define SHIFT_a 0000
128  → #define SHIFT_b 0001
     → #define SHIFT_c 0003

```

Fig. 4 (Prior Art)

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130  →
     → abc = (abc AND ~MASK_b) OR (value << SHIFT_b)
132  → readvalue = (abc AND MASK_b) >> SHIFT_b

```

Fig. 5 (Prior Art)

abc		YYYYYYYYYYYYYYYY	← 134
~MASK_b		1111111111111001	← 136
abc AND ~MASK_b		YYYYYYYYYYYYY00Y	← 138
value		0000000000000011	← 140
value << SHIFT_b		0000000000000110	← 142
(abc AND ~MASK_b) OR (value << SHIFT_b)		YYYYYYYYYYYYY11Y	← 144

Fig. 6 (Prior Art)

200
 → #define <name of bit-field> <BFDN>u

Fig. 7

202
 204
 BFDN ← LEFT-BIT:RIGHT-BIT

Fig. 8

212
 Struct
 {
 Unsigned long field;
 #define a 0000u
 #define b 0201u
 #define c 1003u
 } abc
 206
 208
 210

Fig. 9

214
 Struct
 {
 Unsigned long field;
 #define a 1010u
 #define b 908u
 #define c 700u
 } cba
 216
 218
 220

Fig. 10

222
 → WRITE_BITFIELD(abc, b, value)
 → readvalue = READ_BITFIELD(abc, b)
 224

Fig. 11

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226 → #define LEFTBIT(BFDN) (BFDN / 100)
228 → #define RIGHTBIT(BFDN) (BFDN % 100)
230 → #define FIELDMASK(BFDN) \
    (~((ffe << (LEFTBIT(BFDN) - RIGHTBIT(BFDN))) << RIGHTBIT(BFDN))
232 → #define READ_BITFIELD(ADDRESS, BFDN) \
    ((ADDRESS AND FIELDMASK(BFDN)) >> RIGHTBIT(BFDN))
234 → #define WRITE_BITFIELD(ADDRESS, BFDN, VALUE) \
    (ADDRESS = ((ADDRESS AND ~FIELDMASK(BFDN)) | \
    ((VALUE << RIGHTBIT(BFDN)) AND FIELDMASK(BFDN))))

```

Fig. 12

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236 → ADDRESS | abc = YYYYYYYYYYYYYYYY
238 → BFDN | b = 0201
240 → VALUE | 3 = 0000000000000011
242 → LEFTBIT(0201) | 02
244 → RIGHTBIT(0201) | 01
246 → FIELDMASK(0201):
248 → LEFTBIT - RIGHTBIT | 1
250 → fffe << 1 | 1111111111111100
252 → ~(fffe << 1) | 0000000000000011
254 → (~((fffe << 1)) << 01 | 0000000000000110
256 → WRITE_BITFIELD(abc,b,3):
258 → ~FIELDMASK | 1111111111111001
260 → abc AND ~FIELDMASK | YYYYYYYYYYYY00Y
262 → VALUE << RIGHTBIT | 0000000000000110
264 → (VALUE << RIGHTBIT) AND FIELDMASK | 0000000000000110
266 → ADDRESS | YYYYYYYYYYYY11Y

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Fig. 13